

**CLAIMS**

1. Multiplier arrangement (MUXER) including a pair of input terminals (inmux1,inmux2) to which analog phase information is provided, said multiplier arrangement (MUXER) being further adapted to receive a set of high-frequency local oscillator signals (LO1, LO2, LO3, LO4) which are 90 degrees in phase shifted with respect to each other, said multiplier arrangement (MUXER) being adapted to generate from said analog phase information and from said high-frequency local oscillator signals (LO1,LO2,LO3,LO4), components of a high-frequency phase vector (PV), and to synthesise said high-frequency phase vector (PV) from said components within a summing means (SUM) of said multiplier arrangement,

characterised in that

said multiplier arrangement (MUXER) is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the contours of a square within the complex plane during a first category of predetermined transitions of a phase signal ( $\phi$ ) on which said analog phase information is dependent.

2. Multiplier arrangement (MUXER) according to claim 1 characterised in that

said multiplier arrangement (MUXER) is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the diagonals of said square during a second category of predetermined transitions of said phase signal ( $\phi$ ) which is different from said first category .

3. Multiplier arrangement (MUXER) according to claim 1 or claim 2 characterised in that

said multiplier arrangement (MUXER) is further adapted to receive a set of differential high frequency local oscillator signals (LO1-LO3,LO2-LO4,LO3-LO1,LO4-LO2),

said multiplier arrangement (MUXER) thereby includes a pair of output terminals (outmux1,outmux2) on which said high-frequency phase vector (PV) is provided as a differential high-frequency phase vector.

- 5           4. Multiplier arrangement (MUXER) according to claim 3  
characterised in that

          said multiplier arrangement includes a plurality of multipliers  
(M1,M2,M3,M4), each multiplier (M1,M2,M3,M4) of said plurality having a  
10    respective input terminal (inm1,inm2,inm3,inm4) which is coupled to a first  
terminal of an associated switch (SW1,SW2,SW3,SW4), a second terminal of  
said associated switch being coupled to one of said pair of input terminals  
(inmux1,inmux2) of said multiplier arrangement or to the ground reference  
terminal under control of a respective control signal (c1,c2,c3,c4), said  
multiplier arrangement thereby includes a set of control input terminals to which  
15    said respective control signals are provided.

5. Multiplier arrangement (MUXER) according to claim 4  
characterised in that

          said multipliers (M1,M2,M3,M4) of said plurality of multipliers are  
20    adapted to deliver respective ones of said components of said high-frequency  
phase vector (PV).

6. Multiplier arrangement (MUXER) according to claim 4  
characterised in that

25    a multiplier (M1) of said plurality includes a differential pair of transistors  
(T11,T12),

- respective control terminals of said transistors are adapted to receive  
      respective components of a differential high-frequency local oscillator  
      signal of said set of differential high-frequency local oscillator signals,
- 30    -    respective first conductive terminals of said transistors of said  
differential pair are coupled to the output terminal of a transconductor



9. Signal modulator (SM) according to claims 4 and 8  
characterised in that

said signal modulator (SM) includes a control circuit (CC) adapted to  
receive said phase signal ( $\varphi$ ) and to derive therefrom said respective control  
5 signals (c1,c2,c3,c4) for provision to said multiplier arrangement.

10. Multiplier arrangement (MUXER) according to claim 9  
characterised in that

said control circuit (CC) is further adapted to generate said respective  
10 control signals such that at most two of said multipliers of said plurality of  
multipliers are coupled to a respective one of said pair of input terminals  
(inmux1,inmux2) of said multiplier arrangement (MUXER).

11. Signal modulator (SM) according to claim 10  
15 characterised in that

said envelope limiter (EL) includes another differential pair of transistors  
(Te1,Te2),

- respective control terminals of which are coupled to said pair of  
output terminals (outmux1,outmux2) of said multiplier arrangement  
20 (MUXER),
- respective first conductive terminals of which are coupled to the  
output terminal of a bias circuit (BC),
- respective second conductive terminals of which are coupled to a  
25 pair of differential output terminals (outel1,outel2) of said envelope  
limiter (EL) and being coupled to the supply voltage terminal (Vcc) via  
respective impedance devices (R7,R8).

12. Transmitter (TX) including

- a transmit data source adapted to deliver transmit data to

- a phase accumulator (PAC) of said transmitter (TX) , said phase accumulator (PAC) being adapted to determine from said transmit data a phase signal ( $\phi$ ) for delivery to
  - an analog pulse shaper (BAP) of said transmitter (TX), said analog
  - 5 pulse shaper being adapted to generate from said phase signal ( $\phi$ ) analog phase information for delivery to
  - a signal modulator (SM) of said transmitter being adapted to generate a high-frequency output signal from said analog phase information for delivery to
  - a power amplifier (PA) of said transmitter being adapted to amplify said
  - 10 high-frequency output signal for further transmission to a receiver characterised in that
  - said analog pulse shaper is further adapted to generate said analog phase information as two balanced analog signals ( $B, \bar{B}$ ),
  - said signal modulator is further adapted in accordance to any of the
  - 15 claims 9 to 11.
13. Transmitter according to claim 12
- characterised in that
- said analog pulse shaper (BAP) includes a read-only memory device
- 20 (ROMm) coupled to a digital-analog converter (DAC).

**MULTIPLIER ARRANGEMENT, SIGNAL MODULATOR AND TRANSMITTER**

- 5 A multiplier arrangement (MUXER) is adapted to generate from analog phase information and from high-frequency local oscillator signals, components of a high-frequency phase vector (PV), and to synthesise said high-frequency phase vector (PV) from said components within a summing means is further adapted to provide said high-frequency phase vector (PV) as a vector which is making an excursion alongside the contours of a square within the complex plane during a first category of predetermined transitions of a phase signal ( $\varphi$ )
- 10 on which said analog phase information is dependent. A signal modulator including such a multiplier arrangement as well as a transmitter are described as well.

0355196 \* 051601  
109190 044590